Draft

Variability, Instability, Conditional Programs, Reactive Programs and Market Oriented Policy

by
Robert D. Reinsel

Abstract

Agriculture commodity policy is view from a perspective which identifies sources of quantity and price variation and identifies forces which may result in cronic excess capacity. The report suggests that reactive policy is likly to be an effective method to assist producers in longrun price discovery. Longrun price discovery is viewed as essential for rational resouce adjustment.

Key words: agriculture policy, commodity policy, risk, variability, uncertainty

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INTRODUCTION

"I clearly recognize that in the long run every economic evil creats its own cure. If prices of farm products continue sufficiently long enough below cost of production, there will eventually be forced into bankruptcy enough farmers so that there will be no longer a disastrous surplus. At the same time there will be readjustments of land values, wages, etc., which will lower the production costs. Economic affairs always work themselves out if you leave them alone. However, it is equally certain that they will work themselves out even though you tamper with them. The disadvantage of tampering is that those who do the tampering are likely to be reviled by about half the population." Henry A. Wallace, Dec.28, 1922.(17)

Discussions, seminars, and symposiums have been conducted in the years leading up to consideration of a new farm bill since the 1960's. The past 2 years were exceptional only by the increased number of such conferences. For the most part, the arguments focused on the desirablility of providing for a market orientation in agriculture, but there has not been agreement on the meaning of market orientation. During the discussions, the term has been allowed to remain ambiguous, perhaps in the hope that concensus could be reached without clarity of definition.

However, lacking an agreed upon definition of market orientation or a clear statement of the intent of commodity programs, it has been difficult to determine how to modify programs to achieve a more market oriented condition or, to determine how non-market oriented diverges from the "norm" or standard of perfect competition.

This paper identifies issues associated with commodity policy; developes a rationale for and suggests a possible definition of market orientation; examines how the sector would behave under maket orientation; evaluates the the process of transition; and evaluates whether there is a continuing need for government involvement in agriculture, because of the potential for market failure.

No attempt is made to provide empirical estimates of the effects of alternative programs. These will be reserved for succeeding reports. This report relies on economic theory to suggest interactions and directions.

Competitive markets are the norm or standard by which economists measure economic performance. The argument is made that only in cases of market failure would the economy be better off with government intervention. The pressure to move to market orientation stems from a belief that competitive markets are effective, efficient and equitable allocators of resources and output. That is, competitive markets will result in just the right amount of resources used to produce just the right amount of commodity with equitable compensation for resources.

Past intervention by government to support incomes of certain groups of producers above market clearing levels was based on the premise that market failure caused incomes in the farm sector to be below those in the nonfarm sector. It was deamed equitable, therefore, to provide a larger income to farmers by transfering it from taxpayers and consumers. Presently there are considerable debate over whether these income transfers should be continued. That is, over whether commodity producers still deserve a larger share of the pie or whether the actions of government to support producers incomes is causing the sector to be less profitable than it would be under free market conditions.

Also at issue is whether there is a role for the government to provide for market stability even if it does not provide for an income transfer. And, if market stbility is useful, how can government provide stability?

Some farm groups tend to support continued income transfers to the sector and in particular to producers of specific commodities. Others tend to suggest that the sector is no longer deserving of income transfers but it deserves some protection from the capriciousness of the market which comes about through variability induced by weather and by the actions of foreign governments.(17)

The argument has been frequently made that current commodity programs are not working.(12) However, no statement of purpose has been articulated for the programs, thus, it is difficult to evaluate how well they are or are not performing. The evidence available suggest that the cost of the programs has been higher than some thought desireable. Also the benefits of the programs went to producers with large farms. And, programs supported income but did little to lessen price variability or provide for stable budget cost. In fact, it is the variability and size of the program budget that appears to have been at issue rather than the effectiveness of the income transfer or the effectiveness of the program in achieving market stability.

Although some argue that a market orientation will strengthen agriculture, there is considerable evidence that making agricultural production more competitive may not be good for the sector in either the short run or the longrun. McCalla and Carter argue persuasively, citing Dorfman, Samuelson, Josling and Galbraith ; that "... if ... production agriculture is a

competitive island surrounded by varying degrees of concentration in markets, then deducing conclusions about the advantage of a return to a free market from theoretical constructs may not be valid."(8) They argue that the evidence is not clear that agriculture will be better served by a return to a free market. Also, it is not clear that domestic consumers would benefit.

There is some agreement, among those involved in the debate, that a market oriented agriculture does not mean a total withdrawal of government from commodity markets. What is missing, however, is a reason, based on more than a gut feeling, that continued involvement of the Federal Government would contribute to better market performance.

Market Signals from Competitive Markets

Most economists suggest that it would be desirable for the market to pass through the appropriate economic signals to producers concerning the quantity of resources to use in the production of commodities and, by inference, how much to produce. They also suggest that it would be desirable for signals to be sent to the consumer about how much to consume. In a free and competitive market, where no buyer or seller is large enough to affect the market price and where everyone has equal and perfect information, output will be allocated amoung consumers efficiently by the changing market price signals. The market price adjusts to bring about an equilibrium between the quantity supplied and the quantity demanded. That is, it provides the signal that adjustments must be made. However, this neat theoretical framework assumes perfect knowledge and instantaineous adjustment to equilibrium which is simultaneous for long run and short run positions, ie., there is no short run. Capital, labor and current expenditures adjust so that no excess resources are used in production.

Non Simultinaity of Price and Quantity Changes

The market for farm commodities has several aspects that cause differences from the rigid assumptions of the perfect market: specifically: imperfect knowledge; production and consumption do not adjust similtaneously; production is stochastic and, to the extent that it is affect by weather, random and normally distributed and there is not a fixed relationship between units of input and units of output. Although producers can plan for an expected output and estimate how that output might vary, given sufficient experience they have no basis for determining how much, or in what direction, output will vary in any one year. Planting decisions of produers are made on the basis of an expected price and an expected set of cost relationships that would permit them, under expected conditions, to earn a return over variable cost sufficient to cover some or all of fixed cost. However, because of the random nature of yield variability, it would only be an extreme coincidence that expected cost and actual cost coincided or that expected price and actual price would coincide. Probability therory is of no assistance for it, according to Boulding, "... is merely the mathmatics of the distribution of 'posibilities' ... in situations which can not be empiricaly identified."(1) Thus, the quantity shock that occurs because of yield and weather variability

is a non trivial condition. If no other changes occurred, weather would distort the market by bringing about the mismatch between expected and actual yield and therefore expected and actual prices. As a result, it often takes several production periods to determine the existance of fundamental market changes, that is, shifts in demand or shifts in supply caused by economic forces. This is so because the price in the market allocates the actual supply with demand rather than allocating expected supply.

Floor Prices

Agriculture programs from 1938 to 1985 have by one means or another attempted to establish a floor price for program commodities to address what was percieved to be a low income problem for the sector as a whole. A defense of the floor price was conducted by acquiring stocks and limiting production or marketings. But, a persistant problem remained in the sector. That is, it was exceedingly difficult, if not impossible, for policy makers to establish a floor price to protect income, that would allow the long run market price to be above the floor by a sufficient amount to clear stocks out of farmer or government held reserves. This should not be suprising. Inorder to support income through price supports in a market, demand must be inelastic and prices must be higher than the long run average free market price. The inelasticity of demand has been a major source of problems in setting program parameters because an implicit assumption of the programs has been that variability would be sufficient to empty out the storage. However, this cannot occur unless supply (production) is somehow restricted. Thus, although the legislators and the program managers assumed the problem to be a low income problem, policymakers relied on variability to extract them from the longrun excess capacity problem which they created by the supply control effort. For most of the historical period, long run prices appeared to be below the floor price. As a result stocks accumulated in government ownership as nonrecourse loans were forfieted.

The focus on price as the trigger variable to initiate a government action prevented the price from serving as a true signal for production in future periods. That is, current year prices were not a sound basis for forming expectatons concerning future prices. Also market allocation of the current year's crop was distorted because the distribution of expected price was truncated on the lower end and the expected price faced by the producer was necessarily higher than the price floor.

D.Gale Johnson has said that "The policies of the 1950's were concerned with attempting to protect agriculture from changing conditions." "The policies of the 1960's were reasonably effective in aiding agrilculture to adjust to the inevitable resource transfers and the relative contraction of the farm sector."(6) The policies of the 1980's thus far have tended to "protect" the sector from changing conditions.

Stepping back from current programs and considering the prospects for a long term policy for agriculture, it is possible to conceptualise a framework with both income support and reduction in price variability as objectives and it is possible to develop programs to support either of these objectives. However, a clear articulation of the policy is required. D.Gale Johnson calls this to our attention quit forcefully. "The most critical assumption is the future level of net income of agriculture. For the years ahead we can not rule out a decline in net agriculture income of 10 percent and a decline of farm operator income of some what more. If this were to occur there would probably be some downward pressure on real estate values, unless the income decline were thought to be temporary." He continues; "If my analysis of the flexibility of resource allocation in agriculture is approximately correct, small errors in program formulation will very soon result in substantial cost to taxpayers, and possibly in difficulties in maintainting our preeminent position as a great agricultural exporter. It will, in other words be relitively easy to create significant excess capacity in agriculture by providing incentives, through prices or payments that are inconsistant with the underlying demand and supply situation. Experience has shown clearly that when agricultural output is greater than the demand at politically acceptable levels of prices, a long time and large income transfers are required to eliminate the excess productive capacity."(6)

Just and Rausser have provided a basis for a new look a commodity policy (7,8).They argue that inflexibility in commodity programs has resulted in policy induced variability [instability] in commodity markets, making decision making by farmers and policymakers even more risky than it would be with out commodity programs. They conclude that policy that is conditional in its response to economic conditions will be more likely to result in the transmission of appropriate signals to producers and consumers. Daft cocludes that "The principle strength of the chapter by Richard E. Just and Gordon Rausser is its nontraditional view of commodity policy. The authors assume that the reduction of risk and uncertainty is the principal justificatin for commodity policy. After reviewing the recent track record, they find that commodity policy, itself, has often been a source of instability rather than a cure for it. They attribute much of this policy failure to the attempt by legislators to establish future legislation on past economic conditions. When future conditions deviate from the assumed state, as they inevitally do policy failure has resulted." "...Just and Rausser conclude that legislators should stop trying to anticipate conditions and, instead, adopt policies that would respond automatically to changes in sector economic variables." "As an illistration, they suggest that the government agree to purchase 1 million bushels of grain for every one cent per bushel that the market price falls below a specified target price." The empirical work shows how optimal automatic adjustment coefficients can be derived for specific policy instruments. With the ecomometric model used [by Just and Rausser] the most important conditioning forces are the exchange rate, consumer income, livestock numbers, and world grain stocks. These results show that wheat (corn) price supports should decrease by .945 (847) percent for every 1 percent increase in the value of the dollar; wheat (corn) price supports should decrease by .162 (.091) percent for every 1 percent increase in world wheat (corn) stocks.

While Rausser and Just have performed a major service in providing a new perspective on commodity policy, a further extension of their approach will clarify the fundamental farm policy problem.

DIGRESSION ON PROGRAMS VS POLICY

What we call farm policy is, rather, a collection of programs to control price, hold stocks, and transfer income. In fact, the only consistant aspect of the programs has been the attempt to support incomes. The record of the programs, as they have been administered over their 40 year history, is that they have provied a price floor for program commodities and this floor has resulted in excess production which was stored and which resulted in attempts to reduce production. The net result was that incomes and asset values were higher than they would have been in the absence of the progams. From the record, one would conclude that the major goal of the programs was to keep income above free market levels. Dispite this, however, protection against price variability has often been cited as a major objective. But no consistant policy has been articulated by Congress, farm groups or the several Administrations since the 1930's. The collection of programs has been variously interpereted by economist and policy analysts as providing income support, price stability, protecting the food supply, and protecting the family structure of agriculture. Just and Rausser review the various justifications and conclude that variability is the major problem. Daft, in his review of their work, chides them for dismissing income support, too easily but does not suggest how income support might be provided given the need for conditional policy.

INSTABILITY, VARIABILITY, RISK AND UNCERTAINTY

Acording to Offutt and Blanford, "An unambigious definition of instability would provide the ideal starting point for the selection of an appropriate empirical indicator [of risk]. Unfortunately the concept of instability is nebulous because the perception of what constitutes unstable behavior is largely subjective." "... Variability and instability can not necessarily be equated and require an implicit or explicit judgment be made as to what constitutes 'unacceptable variability'."(11)

For our purposes, it is not necessary that a judgenent be made concerning whether or not variability is or is not accepable. The issues are, is it measurable, is it reduceable and to what extent are variability and uncertainty seperable.

For the purpose of this paper it will be convient to view risk as the measureable variation in a normal random variable, such as yield with a quantifiable probability distribution of the "possibilities". Uncertainty will be considered as being exemplified by supply or demand shocks to the system that are the result of policy or economic variables where the result is expected to be a systematic change or structural change. Such actions are unmeasureable in an expectations framework and no probabilistic statement can be constructed concerning their occurance or outcome.

Much of the research related to variability is associated with the stock holding function and the potential for determining an optimal level of stocks with a concept of covering negative supply deviation 80, 90, or 95 times out of 100. In reality, there can be no optimal stock level for any particular year. Because output for the coming season is a random variable, the optomal stock level must also be a random variable. Given an expectaion of production variability one can construct an expection of the level of stocks that would off set the production deviations. One can not however identify and offset supply and demand shifts as a result of policy or production changes.

Nontrivial Nature of Quantity Shock

The Just and Rausser arguement, that conditional policy will allow the free market to function while providing stability, presumes that it is possible operate as though it was possible to control price and still allow the market to clear because of quantity variability. The conditional policy response suggested by Just and Rausser reacts to both physical and economic phenomeon and attempts to shield the producer or slow the effect of real supply and demand changes as well as the effects of random yield shocks. They presume that conditional control of the effects of other economoic forces on price will reduce the likelihood of policy induced instability. However, Just and Rausser do not consider the possibility and implications of policy induced excess capacity as the result of conditional intervention which prevents the full impact of supply and demand shifts from being realized because of the manipulation of the market price.

Pass Through of Market Signals

While it is possible to mathmatically estinate a number for the coefficient of variatation of price, the number is meaningless unless the price variation is random and normally distributed with mean zero. Historical price data contain both random and systematic changes and there is little reason to believe that the deviation will be normally distributed or that the esimate will be unbiased. There is, however, reason to believe that in the absence of market intervention policies the effects of weather would, over time, be nornally distributed and it would be possible to remove the weather related effect from prices. It would also be possible to estimate the effects of a stocks management program that reacted to weather variation by aquiring, for example; yield in excess of expected normal and disposing of stocks if yield is less than expected normal.

Under conditions where long term supply and demand were in balance the smoothing effect on quantity would result in a stablity of domestic consumption and a stable supply for export. Such a stocks management policy would minimize the impact of domestic weather variation on commodity prices. All other factors would be reflected in the market including demand and supply shifts as a result of technology or changes in financial or macro policy variables. The effects of weather in importing countries and on competing exporters would also be transmitted through the market. Also the impact of their policies would be felt.

Implication for Stock Holding

Numerous studies of price variability and variability of quantity marketed, through domestic and export channels, have been conducted. Most have assumed that deviations in price from trend or deviation of production from trend were normally distributed random variables with mean zero.(12,14,15) Therefore, the analysts also assumed that the probability of the actual deviatons being less than a specified number is also a normally distriuted random variable. However, the normal random variable assumption appears not to be a correct specification of the behavior of either production or price. Many of the forces in the market are systematic and result in deviations that do not have zero mean. This is not to say that a mathmatical representation with the sum of the deviations equal to zero can not be constructed. But that such a construct is an erroronious representation of the forces causing market prices and quantities to change.

Some have viewed the wide price changes of the 1970's as an indication of increasing variability in the market and concluded that the randon forces causing such disturbances may increase in the future. However, many of the events of the seventies appear to have been systematic structural changes which in connection with random yield disturbance resulted in a confusing set of prices. For example; entry of the Soviet Union into the market on a major scale to aquire grain for livestock feed was a systematic change rather than a random event, as was the decision by the Chinese to buy wheat rather than tighten their belts and the decesion of the U.S. to raise loan rates and target prices rather than let farm income decline in the late seventies. Even the weather shocks on foreign yields are transmitted to our markets through a set of systematic filters that distort the random nature of the yield variability. Thus, the most truely random influence in the market is the effect of domestic weather on domestic yields. All other changes fall into the category of uncertaintity or instability. And, it is these changes that are structural or systematic in nature that should be reflected in market price signals.

Under conditions where long term supply and demand were in balance the smooting effect of a reactive policy to acquire postive increments to trend yield and store them until they could be disposed of in periods of low yields would result in stability of supply for the domestic and export markets. Such a stocks managenent program would minimize the impact of domestic weather variation on commodity prices.All other factors would be reflectd in the market including demand and supply shifts as a result of tecnology or changes in macro or policy variables.

Sharples and Skaughter suggest that "Adding to or releasing from buffer stocks in response to changes in quantity produced would stablize the major source of food price variance in a closed system. That is if, operated world wide, such a program would provide reasonably stable food supply and prices. Theoretically, a buffer stock managed by such a quantity rule would stabilize prices with minimal interferience with the allocative function. Prices would be free to respond to changes in demand, [and changes in supply] and the allocative signals so generated would not be clouded by the noises of price

changes in response to production varances occasioned by weather vagaries." However, they dismissed the quantity rule because production worldwide is difficult to measure and the size of the quantity buffer stock may preclude the response required. While they suggest that the price rule may be appropriate they recognize that it runs the danger of obscuring allocative signals generated by non-random supply and demand shifts. "This suggests that the program have built in self corrective features in order that the reserve acquisition and release prices adjust in accordance with the longrun moving equilibriun.

Worldwide rationality on stockholding policy would imply that all producing countries would srore the positive deviations from trend yield and dispose of them during periods of negative deviations. Storing more than the positive deviations from trend would require that in some year the market would have less available than had been planned for by producers or expected by consumers. Storing less than the positive deviations means that the probibilty of incurring a shortfall in stocks is increased because the positive increment from yield has not been stored but consumed and future consumption must be reduced below what it could have been if stocks had been retained.

If the U.S. changes it policy from encouraging excess production with supported prices to free market pricing, then the appropriate response to changes in export demand would be to allow the market to clear, with the exception that the U.S. would stand ready to buy or sell the additions to or shortfalls from trend yield on what ever acreage was planted. Under such conditions the U.S. would not export its' domestic variability from weather on to the world market.

THE ARGUMENT OF CONTINUING MARKET FAILURE

Hetrogeneity in the cost of production and marketing, which is the result of hetrogeneity in size, management, technology and location will result in continuing excess capacity disequilibrium and loss of resources from the sector regardless of the form of policy. Because cost vary amoung firms, any price level within the range of total cost will result in some firms being driven out of the production while others continue to earn returns in excess of their production cost. As a result the assets of the exiting firms will be recombined with those of the more profitable firms and production is likely to expand or cost decline or both, because of the efficieny of the aquiring firm. With no change in demand, price is likely to decline and additional firms will be forced to exit. Continuing consolidation of assets will occur until a homogeneity of sorts is achieved or until an oligoplistic system is developrd which permits some control of output that will allow the least competitive firm in the production structure to remain in production because allocation of market shares has occurred.

Policy analysts have identified two basic factors that have been important for agriculture policy determination in the United States. One is a tendency for output to increase faster than consumption. The other is a high degree of

variation incommodity output and prices variation, which results in variation in earnings. The purpose of this analysis is to explore the causes of excess capacity and price variation and identify how various types of policies and programs might be used to assist in overall adjustment of the farm sector.

The following analysis attempts to seperate the various reasons for price and income changes and suggests how particular policy tools may relieve or exacerbate price and income stability and excess capacity problems.

SUPPLY/DEMAND SHIFTS CAUSE CAPACITY AND VARIABILITY PROBLEMS

Prices are the result of the simultaneous interaction of supply and demand and, therefore, before corrective policy actions are taken, it is important to understand whether the changes in price are the result of shifts in supply or demand or some combination of the two. It is also essential to understand whether the shift is a result of short-term or long-term phenomena. Lack of clarity, in identifying the source of the change in price or in the reason for a particular price level, can lead to a choice of policies that exacerbate rather than correct the perceived problem.

The unique aspects of agriculture are that and agricultural production is subject to the random impact of weather and food is basic to survival. There is, thus, a general concern that some groups within the population (either domestic or world population) will have insufficient income to acquire sufficient nutrition for their existence at market determined prices.

Humanitarian Aspects

A humanitarian goal of society is that no one starves regardless of their ability to purchase food. To achieve this goal, output must be greater than the free market would be expected to achieve. This can be achieved by a shift in demand by transferring income to the disadvantaged (for example, through food stamps or other direct income transfers) or by a shift in supply making commodities available to certain segments of society at subsidized prices or through donations. This aspect of agricultural puts it somewhat in the nature of a public utility which must provide service to all segments of society.

Enhancement of the effective demand or expansion of the quantity marketed, is complicated by the biological nature of the production process, the random disturbances in the market created by weather and the inelasticity of demand for the product. These biological factors produce short-run changes in market supply (quantity available for consumption) that make discovery of long run prices extremely difficult and therefore longer term investment and subsidy decisions are frequently made from erroneous price expectation. Improvement of longrun price discovery is the primary focus of the remainder of this paper.

Because agriculture is a biological process, it is subject to seasonality, perishability of output, weather related problems and environmental problems including insects, disease, and weeds. Environmental consideration preclude agricultural production in some regions and enhance it in others and alter the feasible output mix in a particular geographic area. To some extent these biological considerations are manageable. That is, we have the ability to modify the environment so that supplies can be obtained at prices that permit adequate returns to the producer for investing in the environmental modification technology. In the following sections, the various biological factors and the implications of allowing the sector to deal with them under free market conditions are considered.

Seasonality

Seasonality is a major source of variability in commodity prices. It results in an imbalance between output and consumption on an intra-annual basis. Seasonality leads to depressed prices in the market at the time of harvest and higher prices in other periods of the year. The seasonality problem is known before the producer plants his crop and he can, therefore, account for it in the decisionmaking process. If the commodity is storable the producer has the opportunity to build or contract for adequate storage prior to harvest in order to obtain the return from placing the commodity on the market in periods of short seasonal supply. The producert decides among the returns from holding inventory and the returns from immediate sale to someone who is willing to hold the inventory or provide the time management service.

Historically the argument has been made that farmers were uninformed concerning the marketing of their products and needed assistance to prevent them from being exploited as price takers during the harvest season.

Perishability

The parishable nature of some commodities precludes storage and, because production is seasonal, intra-annual price instability is a virtual certainty, with abundant supplies in some seasons and shortages in others. Production of perishable commodities is known to be a high risk venture, yet, producers are able to cope with the problem. With proper management, the shelf life of some perishable commodities can be extended so that commodities are available in a fresh form longer than nature would normally allow. For many products, transformation by processing extends the shelf life through out a full year. Such storage and processing functions are performed by the commercial sector utilizing cost effective technologies. Also, some extent, production of very perishable commodities has been concentrated in very large firms where supply management is a reality. At the other extreme, production occurs in very small firms that produce for specialty markets or for seasonal consumption. The perishable nature of some commodities has also resulted in a diversification of production locations based on seasonal suitability for production. As a result, supplies tend to be available over a longer time span.

Weather

Weather changes result in unplanned changes in output which can dramatically shift the quantity available for market and because of the inelastic nature of aggregate demand and even more dramatically change prices and earnings. Weather disturbances can be global, national, regional or local. The following sections isolate specific weather phenomena; local random events, local nonrandom events, and generalized weather conditions; according to their impact on output, prices, producer income and consumer expenditure, and evaluate how such conditions suggest a role for public or private sector intervention in markets.

Local Random Events: Farmers have always been subject to weather conditions which may destroy their crop but which leaves their neighbors' crop untouched. Because such events are localized they have almost no noticeable impact on prices, national farm income or consumer expenditure. Hail and wind are the primary examples and, of all weather factors, these tend to be the most nearly random in occurrence across the area used for agricultural production. Even with these factors, however, certain areas of the country are more prone to have high winds or tornadoes and more prone to be affected by hail. These areas have a higher risk than elsewhere but within the area, the risks are nearly equal. The randomness of the events makes it feasible to calculate accurate tables for the probability of occurance of specific output changes and therefore makes it feasible to calculate the cost of insuring against such losses.

Pooling of risk through private insurers makes it possible to spread the risk and reduce the possibility of a major or disastrous loss by incurring a fixed annual fee. If long-term price discovery is relatively easy, the cost and value of an insurance scheme are easily determined and the options for buying insurance or self insuring are easily calculated. However, when estimation of expected prices and revenues are uncertain, the problem of deciding on the level of fixed cost to be incurred for insurance becomes much more complex because a fixed fee is paid for a specific level of yield reduction but an uncertain level of revenue protection.

Local Nonrandom Events: For some farmers, local weather and topography conditions are such that they are subject to drought, flood or frost. These conditions are spacially confined and nonrandom from the standpoint of area impacted. However, the impacts on the area may, in some sense, be random over time. Such conditions are uninsurable from a private sector viewpoint, because all producers in the area are likely to be impacted in any year. Thus, there is a high probability that any risk pool, developed by those likely to be impacted, would be insufficient to cover losses in any particular year.

Whether or not society at large chooses to provide assistance to such producers by underwriting insurance programs or through other forms of assistance depends on the perceived societal need for the output from such

areas, the perception of the impact on other sectors of the economy and on societies perception of the ability of the individual to evaluate the risks of production in such an area. At present, programs are in place which suggest that there is a societal role in protecting producers in these areas. All risk crop insurance, disaster payments, and FmHA disaster and economic emergency loans are all directed, in part, at such problems. The net impact of such programs on total output is not analyzed in this report, however, the economic implications are rather clear. These programs encourage farmers to produce in high risk areas. More resources are employed in agriculture than would otherwise be the case. The value of land in the area is higher than it would be in the absence of such programs, because downside risk is reduced. And, expected returns are higher for such producers. Total net earnings for the sector are reduced (excluding the income transfer) because of the inelastic demand and the increased output.

Whether society needs the production from these high risk areas and wants to encourage continued production in these areas is the major question that must be answered. If the answer is no, then the question of whether there is a societal role in encouraging and assisting producers to leave these areas or to shift to the production of crops which have a low risk from the environmental factors should be addressed. In the absence of public programs, there is a natural economic process whereby the environment dictates the crops to be grown. Producers in frost, flood or drought areas should understand the risk involved and choose to produce or sell based on their evaluation of the cost and returns.

General Yield Variation: General variation in weather results in the major source of annual variability in agricultural output and, therefore, annual variability in prices. Because the U.S. has an open economy, worldwide weather changes must be considered as impacting on the total supply of commodities in our markets. Since the impact of weather on the quantity of output for any production season is unknown at the time a crop is planted, producers find it impossible to plan for such changes and must formulate their production decisions on some expected normal yield. Once the resources are committed to production the producer has little control over output and yields may vary sharply from the expected level. The wide variation in yield results in price changes that are magnified beyond the size of the yield changes because of the inelastic aggregate demand. Thus, income from production can vary from large positive returns to losses.

Governments have recognized the basic problem of production variability at least since the biblical days of Joseph. However, the effectiveness of Governments in dealing with the problem has changed very little. Early concerns were on the side of food security; maintaining an adequate supply of food for those years in which weather resulted in a small crop. Thus, the emphasis was directed to storage facilities, which would prevent waste of a large crop and insure that supplies were carried over for years of low yields. Several thousand years later it was recognized that farmers were adversely affected during years of a large crop because the inelastic demand for farm commodities resulted in low prices and low incomes and storage was undertaken to support farm prices.

These weather-related quantity changes present a confusing set of price and earnings signals to producers and to those concerned with farm policy. In one year it may appear that too many resources are employed, in another it seems that too little output will be forthcoming. Prices for output from a particular crop are those which allocate the production among the consumers in an efficeint manner. They have little relationship to the resources employed in producing current years crop. Therefore, discovery of long run prices and returns is difficult if not impossible. Without information on long run prices determining the level of capital and other resources to commit to the production process is a very "risky" process because of the uncertainty of whether the quantity supplied and demanded are in balance or are diverging, that is, whether long run real prices are rising, falling or stable. Ideally, farm output should respond to longer run price signals which would tend to indicate relative surplus or scarcity and which would encourage greater or less resource use in the production of farm output. It seems that it is undesirable to have the sector respond to short run output shocks from weather which have nothing to do with the economic resources committed to the system or with changes in demand. It has been argued that the inelasitc nature of aggregate demand is the primary cause of agricultural price variability. 3/ However, an inelastic demand does not mean that prices will be highly variable. It means that, if supply shifts relative to demand or demand shifts relative to supply, price changes will be large relative to the changes in quantity. The inelasticity of the demand function is, therefore, important because it magnifies the price and revenue consequences.

The lack of correspondence between the input decisions based on ex ante expectations of price and revenue and the ex post price determined by market allocation of output may be the most important problem of the sector. To some extent the private sector adjusts to these random disturbances by developing storage facilities that are slightly larger than needed for the normal crop and by carrying more over from a really large crop than from smaller crops depending on the expected revenue from storage. However, the amount that the private sector might choose to store is likely to be less than that which society in total might choose to store in order to meet a societal goal of minimizing hunger and starvation. In effect, a societal decision to store commodities is likely to be determined by different objective functions. Although the private sector may try to equate marginal cost and marginal revenue from storage, society at large may desire, among other objectives to stabilize prices, prevent hunger and minimize resource redistribution. By capturing a larger quantity of the production in storage in abundant crop years, rather than permitting it to be allocated among consumers, and by releasing this stored commodity in years of short crops, total resources required for production are effectively reduced. However, the commitment of resources for storage is increased. Thus, moving from a system which has no storage beyond the commercial sector to a system with Government storage, would create a disequilibrium by shifting the expected annual availability of the commodity and result in a long-term downward adjustment in total resources employed.

The greater the inter-annual variation in output, the more plausible the societal role in providing storage. Viewed in an otherwise stable situation, that is, no changes in technology and no abrupt shift in consumption, it is in the interest of society for the Government to intervene in the market to even

out available supplies from large crop years to small crop years. How this intervention is conducted becomes critical to the effectiveness of other farm support activities. Also, the underlying tendencies in the market in terms of supply/demand balance determine the effectiveness of the stocks management program.

ECONOMIC FORCES

To this point the discussion has focussed on the impact of biological factors and weather changes on farm prices and farm income. This section focuses on supply and demand shifts resulting from economic forces.

Demand Shifts

Demand shifts occur because of changes in population, taste and preferences, and income. They may also result from policy decisions made about, and applied to, other sectors of the economy. The demand shifts may be temporary (a few quarters) or they may be permanent. Whatever the cause, a decrease in demand (a shift to the left of the demand schedule) results in consumers buying less of the commodity at any schedule of prices. If no change in the supply occurs, the result of the demand change will be that the price will fall and some smaller quantity will be consumed. In order to achieve an equilibrium some resources must be removed from production. In a free market this occurs because revenue is reduced to the point where it is unprofitable for some producers to produce the commodity and resources are transferred to other employment or underemployed. Setting prices above the new equilibrium level, to maintain producer revenue, results in the accumulation of stocks (inventories). If the demand reduction is permanent or extended, a rigid price floor results in continuous stock accumulation.

Supply Shifts

Changes in supply occur primarily because of changes in technology, changes in the relative price of inputs or changes in the real price of inputs relative to output. For example, adoption of a new technology may result in the ability to produce more grain from the same resources and lower the cost of grain per bushel. Such a change means that at any schedule of prices more grain would be offered for sale. As in the case of a reduction in demand fixing the price above new equilibrium will result in accumulation of stocks.

External Policy Impacts

In addition to the impact of normal economic forces in a free market economy, the farm sector is subject to the impact of Government intervention in other sectors. For example, supply shifts occur as result of tax policy changes that encourage businesses to make investments. In particular, the use of investment credit and accelerated depreciation cause more resources to be employed in the production of crops than would be used without these investment incentives. Tax policy that allows the write off of farm losses against other income provides an incentive to continue farm production even

though losses are being incurred. The net effect is to keep more resources employed in production than would be employed without the tax incentive.

Credit policy also encourages the employment of more resources in the sector to the extent that it provides interest subsidies or makes loans available to producers who could not obtain funds through commercial channels.

Monetary and fiscal policy have a substantial impact on the demand for commodities though their impact on business cycles and domestic income and though their effect on foreign exchange rates. Under a restrictive monetary policy which keeps U.S. interest rates above those in other countries the dollar tends to valued higher relative to the currency of potential importers. Thus, prices for U.S. commodities are inflated in the export market and the net effect is the same as if the U.S. supply was shifted left or as if an export tax were imposed on U.S. goods.

Presented with such problems policy makers are often disposed to create exceptions to a policy or to provide for offsetting special conditions. For example, to offset the impact of restrictive monetary policy on farm commodities, export subsidies may be instituted. The result is that the consumer and the taxpayer pay a higher price for the commodity, transfer income to the farmer and subsidize the foreign buyers.

Using farm commodity policy to protect farmers against price and income variability or against "low" incomes is to treat the symptom rather than the problem. Price and income changes occur in response to shifts in supply or demand . The cause of the problem must be uncovered be for a treatment can be proposed. If the source of the problem is outside the sector then perhaps that is the place to develop corrective policy, if such policy is needed. If tax laws are encouraging excess resources in production then a change in the tax law would be in order. If the problem occurs because of forces that are the result of random weather shocks then appropriate tools can be developed to react to but not anticipate weather changes.

ALTERNATIVE FUTURES AND THE IMPLEMENTATION OF POLICY

The need for and the effectiveness of agricultural policy will be determined by the continued certainty of yield variability and by the relative change in output and consumption trends.

If consumption is rising coincident with or faster than output, real prices will tend to remain flat or rise slightly. On the other hand, if output is tending to rise faster than consumption real prices will tend to fall.

In part, because of past price support policies, more resources are employed in crop production than the level needed to meet domestic and export demand at current prices and stocks are tending to accumulate. To remove the excess

capacity from the sector, real prices for output and real earnings must fall to levels which force disinvestment from the sector, resources must be acquired from producers and removed from production, or demand must grow more rapidly than output for an extended period.

Allowing real earnings to fall to the point where a large number of resources are forced out of the sector is a painful solution. Expansion of demand (shifting demand) at a fast enough rate to keep prices from falling appears to be economically impossible. The most feasible solution appears to be some type of resource diversion in combination with stability programs. Achieving the appropriate balance is complicated by the random variation of weather which results in highly variable yields and therefore highly variable prices which gave inappropriate signals for long-term resource commitments. Arbitrarily establishing a rigid price floor or a target price without regard to longer term market forces results in price certainty and has a high probability of providing the wrong type of information about future profitability. Tying price floors to current production costs results in distortion of market signals in a manner that tends to escalate future costs. This results in higher support levels in the future, higher production costs and in a rachet effect on support prices. On the other hand, allowing the market to set output prices without accounting for random disturbances from weather distorts the longer run economic signals that occur from changes in demand or changes in technology and output. These are the economically determined signals that we wish to have the market transmit.

Providing protection against random shocks to the system need not distort long-term market signals if the shocks are not the result of economic forces that is, if they are due entirly to weather. However, if income declines as a result of a change in the business cycle, providing price protection against the shift in demand will result in commitment of more resources in production than would be required. Or, if demand shifts as a result of a change in foreign exchange rates, establishing a price floor could result in a greater reduction in trade than would result from a market determined price.

SUMMARY

The previous discussion suggests that, farm commodity producers are subject to the risk of low levels of income because of the impact of weather and economic forces on the production, marketing consumption and prices of the commodities they produce. Because agricultural production is a biological process which results in the disassociation of the commitment of resources to the production process and the output of those resources, and because rainfall and temperature are not subject to the control of the producer the relationship between committed inputs and output is not fixed. Because the input/output relationship is not fixed and the impact of weather is random in nature, the producers best expectation of the price for the next crop year is likely some average of historical prices. If resources are committed with the expectation of normal yields and prices and the output results in a significantly better or poorer crop, prices and incomes can be dramatically altered, although the producer planned appropriately given his limited information.

Historically, society has recognized this risk and has attempted to protect producer from the most severe aspects of a random loss of income and consumers from the loss of the commodity. In the 1930's, programs were established to put a floor under prices and thus prevent farm income from falling during periods of excess production. In order to support prices, nonrecourse loans were made. The loan rate became the price floor and crops not sold were forfeited to the Government.

As income increased, production at the supported price increased and stocks accumulated in Government storage as markets failed to clear and loans were forfeited. To limit stock accumulations, various marketing controls and production controls--largely through acreage diversion and acreage allotment programs--were instituted. In the 1970's with acreage diversion and export subsidy programs in place, to help clear stocks, supplies diminished and prices rose rapidly. To prevent rapid price increases in the future, a farmer-owned reserve was introduced. A set of target prices and deficiency payments were established to in part guarantee an income transfer to producers who cooperated in supply control and stocks management programs while the loan rate or price floor was to be set near market clearing levels.

Although there may be differing points of view as to how farm policy should be accomplished, the basis for a future farm policy appears to be linked to the following premises.

1. There is a societal belief and general concensus that farmers should receive some degree of protection from the random force of weather.

2. There is a need to hold some level of stocks against the possibility of a shortage of production but stocks should not be permitted to accumulate to the point where they will not be removed by normal short crop years.

3. Current year market prices do not allocate resources to the production of commodities in an efficient manner in the short run because of the temporal dislocation of inputs and production and because output is to some extent random. In the long run, resources will tend to be allocated by output prices if long run market signals can be determined.

4. Neither the Government or the farmer can correctly anticipate or forecast the outcome of a specific crop at planting time except by chance, therefore, programs should be designed to be reactive to crop output rather than anticipate crop output.

5. Because commodity prices have been supported above market clearing levels in the majority of years since the 1930s the sector currently employs excess resources in the production of price supported commodities.

6. Market prices will efficiently allocate output among consumers.

7. Protecting farmers from downside income risks requires two forms of programs. One to protect individual producers from the loss of a crop due to random weather events that are localized in nature and another to protect all producers from the price depressing impact of an exceptionally large crop.

8. Consumers desire some form of protection against scarcity from a short crop.

9. Tax payers desire to minimize government expenditures.

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